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TITLE : ALUMINUM-HYPER-EUTECTIC SILICON ALLOY LOW IN HARDENING SENSITIVITY,  
AND ITS MANUFACTURE

ABSTRACT : PROBLEM TO BE SOLVED: To improve the extrusion property, the cuttability, and the high hardening sensitivity, and to provide high strength even at a slow hardening speed by regulating the composition consisting of Si, Cu, Mg and Al, the grain size of the Si particles, the hydrogen content, and the oxide content.

SOLUTION: In an Al-hyper-eutectic Si alloy consisting of, by weight, 12-45% Si, 0.2-5% Cu, 0.2-5% Mg, and the balance Al with inevitable impurities, the mean grain size of the Si particles at an arbitrary structural cross section is below 10  $\mu\text{m}$ , the hydrogen content is below 0.7  $\text{cm}^3/100 \text{ g-Al}$ , the oxide content is below 0.2 wt.%. The molten alloy is kept at a temperature between the liquidus temperature +50°C and the liquids temperature +150°C, and is made into liquid droplets using an inert gas such as nitrogen to prevent oxidization. The liquid droplets are adhered to each other in the semi-solidified condition while quenched, and deposited. Internal pores are eliminated by achieving the hot plastic machining of this alloy preform at a temperature of 300-500°C, and the relative density is made to  $\geq 99.5\%$ .

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